## CLAIMS

1. An organic semiconductor device comprising: a source electrode; a drain electrode; and a p-type organic semiconductor layer sandwiched between the source electrode and the drain electrode, characterized by further comprising an n-type organic semiconductor layer formed in an intermediate portion of the p-type organic semiconductor layer; and a gate electrode embedded in the n-type organic semiconductor layer.

2. An organic semiconductor device according to claim 1, characterized in that the gate electrode has a flat plate shape.

3. An organic semiconductor device according to claim 1, characterized in that the gate electrode is formed in a comb-like or screen-like pattern.

4. An organic semiconductor device comprising: a source electrode; a drain electrode; and a n-type organic semiconductor layer sandwiched between the source electrode and the drain electrode, characterized by further comprising a p-type organic semiconductor layer formed in an intermediate portion of said n-type organic semiconductor layer and a gate electrode embedded in said p-type organic semiconductor layer.

5. An organic semiconductor device according to claim 4, characterized in that the gate electrode has a flat plate shape.

6. An organic semiconductor device according to claim 4, characterized in that the gate electrode is formed in a comb-like or screen-like pattern.

7. An organic semiconductor device comprising: a source

electrode; a drain electrode; and an organic semiconductor layer sandwiched between the source electrode and the drain electrode and having a carrier transporting property, characterized by further comprising a gate electrode constituted of at least two intermediate electrode pieces which are embedded in the organic semiconductor layer, wherein the intermediate electrode pieces are respectively provided in at least two planes separated from and parallel to the source electrode and the drain electrode, and are positioned in a direction across the layer thickness.

8. An organic semiconductor device according to claim 7, characterized in that the intermediate electrode piece has a flat plate shape.

9. An organic semiconductor device according to claim 7, characterized in that the intermediate electrode piece is formed in a comb-like or screen-like pattern.

10. An organic semiconductor device according to any of claims 7 to 9, characterized in that the organic semiconductor layer is constituted of a material having at least either of an electron transporting property and a positive hole transporting property.

11. An organic semiconductor device according to any of claims 7 to 9, characterized in that the two intermediate electrode pieces have overlapping portions which are mutually separated across a part of the organic semiconductor layer.

12. A method for producing an organic semiconductor device provided with an organic semiconductor layer formed between a source electrode and a drain electrode and embedding a gate

electrode therein, the method being characterized by comprising:

a first organic semiconductor layer laminating step of forming a first organic semiconductor layer on either of a source electrode and a drain electrode;

a first intermediate electrode piece laminating step of forming a first intermediate electrode piece on a part of the first organic semiconductor layer;

a second organic semiconductor layer laminating step of forming a second organic semiconductor layer on the first organic semiconductor layer and the first intermediate electrode piece;

a second intermediate electrode piece laminating step of forming a second intermediate electrode piece on a part of the second organic semiconductor layer so as to cover the source electrode and the drain electrode in a complementary manner with the first intermediate electrode piece; and

a third organic semiconductor layer laminating step of forming a third organic semiconductor layer on the second organic semiconductor layer and the second intermediate electrode piece;

wherein each of the second and third organic semiconductor layer laminating step includes an embedding step of softening the formed organic semiconductor and embedding the intermediate electrode piece therein.

13. A method for producing an organic semiconductor device according to claim 12, characterized in that the embedding step heats the first organic semiconductor layer to a temperature equal to or higher than a glass transition temperature thereof but equal to or lower than a melting point thereof.

14. A method for producing an organic semiconductor device according to claim 12, characterized in that the organic semiconductor layer is formed by an evaporation method.